

feet to a point; thence South  $68^{\circ}59'$  West 55.83 feet to a one-inch iron pipe marking the point of a 558.14 foot radius tangent curve to the right; thence southwesterly along said curve through an angle of  $38^{\circ}26'20''$  (the chord of said curve bears South  $88^{\circ}12'10''$  West 367.46 feet) an arc distance of 394.57 feet; thence North  $54^{\circ}10'$  West along the said northeasterly line of said 33-foot easement conveyed by A. F. Jones to Northern Electric Company a distance of 137.97 feet to the point of beginning.

ALSO EXCEPTING THEREFROM the following described parcel:

A portion of Section 26, Township 22 North, Range 1 East, Mount Diablo Base and Meridian, said portion being particularly described as follows:

Commencing at the point of intersection of the Southeast line of 20th Street (formerly 8th Street) as shown on the official map of Mulberry Tract. Subdivision No. 1, filed in the office of the County Recorder of Butte County, State of California, on March 4, 1907, in Map Book 6, page 90 and the northeasterly line of that certain strip of land 33.0 feet wide conveyed by A. F. Jones to Northern Electric Company by deed recorded September 18, 1905, in Book 83 of Deeds, page 360, Butte County Records, said point of commencement being the point of beginning of that certain 2.113-acre parcel of land quitclaimed by Sacramento Northern Railway to Victor Muscat and Clay McGowan by deed recorded December 8, 1961, in Book 1153, Official Records of Butte County, Page 143; thence from said



point of commencement North  $35^{\circ}50'$  East along said southeasterly line of 20th Street and along the northwesterly line of said 2.113-acre parcel of land, a distance of 271.10 feet, to the point of beginning of the parcel of land to be described, said point of beginning being the most northerly corner of said 2.113-acre parcel of land; thence from said point of beginning south  $54^{\circ}10'$  East along the northeasterly line of said 2.113-acre parcel, a distance of 459.52 feet to the most southerly corner of said parcel of land; thence North  $68^{\circ}59'$  East along the Northeasterly projection of the southeasterly line of said 2.113-acre parcel, a distance of 5.97 feet; thence North  $54^{\circ}10'$  West, parallel with and 5.0 feet northeasterly, measured at a right angles from said northeasterly line of said 2.113-acre parcel, a distance of 462.78 feet, to a point on said southeasterly line of 20th Street; thence South  $35^{\circ}50'$  West along said southeasterly line a distance of 5.0 feet to the point of beginning.

ALSO EXCEPTING THEREFROM the following described property:

A portion of Section 36, Township 22 North, Range 1 East, M.D.B. & M., said portion being particularly described as follows: BEGINNING at the point of intersection of the Southeasterly line of 20th Street (formerly 8th Street) as shown on the Official Map of Mulberry Tract Subdivison No. 1 recorded in the office of the Recorder of the County of Butte, State of California, on March 14, 1907, in Map Book 6, at page 90, and the Northeasterly line of

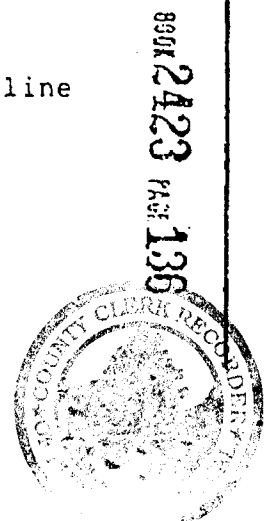


that certain strip of land 33.0 feet wide conveyed by A. F. Jones to Northern Electric Company by Deed recorded September 18, 1905, in Book 83 of Deeds, at page 360, Butte County Records, from which point the point of intersection of the Southeasterly line of said 20th Street and the Northeasterly line of Park Avenue bears South  $35^{\circ} 50'$  West 33.0 feet; thence South  $54^{\circ} 10'$  East 137.97 feet; thence North  $88^{\circ} 12' 10''$  East 367.46 feet; thence North  $68^{\circ} 59'$  East 121.62 feet to the point of beginning of the parcel of land to be herein described; thence from said point of beginning North  $58^{\circ} 35'$  East 31.77 feet to the beginning of a tangent curve to the left with a radius of 317.46 feet; thence Northerly along the arc of said curve (through a central angle of  $51^{\circ} 41' 50''$ ), an arc distance of 286.44 feet to a point on the Northeasterly line of a parcel of land deeded by Sacramento Northern Railway to Victor Industries recorded in Book 758, of Official Records of Butte County, California, at page 105; thence along said Northeasterly line South  $54^{\circ} 12'$  East 202.42 feet to the most Easterly corner of said above mentioned parcel of land; thence South  $68^{\circ} 59'$  West 365.28 feet to the point of beginning.

PARCEL TWO:

A portion of Section 36, Township 22 North, Range 1 East, M.D.B. & M. said portion being particularly described as follows:

BEGINNING at the point of intersection of the Southeasterly line



of 20th Street (formerly 8th Street) as shown on the Official Map of Mulberry Tract Subdivision No. 1 recorded in the office of the Recorder of the County of Butte, State of California, on March 14, 1907, in Map Book 6, at page 90, and the Northeasterly line of that certain strip of land 33.0 feet wide conveyed by A.F. Jones to Northern Electric Company by Deed recorded September 18, 1905, in Book 83 of Deeds, at page 360, Butte County Records, from which point the point of intersection of the Southeasterly line of said 20th Street and the Northeasterly line of Park Avenue bears South 35° 50' West 33.0 feet; thence along said Southeasterly line of said 20th Street, North 35° 50' East a distance of 631.61 feet to an iron pipe from which the intersection of the Southerly production of the centerline of Hemlock Street as shown on Map of said Mulberry Tract, with the Southeasterly line of said 20th Street bears North 35° 50' East a distance of 2.39 feet; thence leaving the Southeasterly line of said 20th Street South 54° 12' East a distance of 278.47 feet to the Southerly corner of a parcel of land deeded from Victor Industries, a corporation, to Victor Muscat, et al, recorded in Book 896, of Official Records of Butte County, State of California, at page 219, said corner being the point of beginning for the parcel of land to be described; thence from said point of beginning North 35° 50' East 157.57 feet to a point that is South 35° 50' West 15.36 feet from the most Easterly corner of the above mentioned Deed; thence South 41° 47' East 4.74 feet; thence

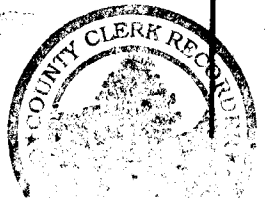


on a tangent curve to the right with a radius of 317.46 feet (through a central angle of  $48^{\circ} 40' 10''$ ) an arc distance of 269.66 feet to a point on the Northeasterly line of a parcel of land deeded by Sacramento Northern Railway to Victor Industries, a corporation recorded in Book 758, of Official Records of Butte County, California, at page 105; thence North  $54^{\circ} 12'$  West along said Northeasterly line 214.36 feet to the point of beginning.

PARCEL THREE:

Being a portion of Section 36, Township 22 North, Range 1 East, M.D.B. & M., said portion being particularly described as follows: BEGINNING at an iron pipe on the Southeasterly line of 20th Street, formerly 8th Street, as shown on the Official Map of Mulberry Tract Subdivision #1, recorded in the office of the Recorder of the County of Butte, State of California, on March 14, 1907 in Map Book 6, at page 90, distant thereon North  $35^{\circ} 50'$  East 664.61 feet from the Northeasterly line of Park Avenue, said point being the most Northerly corner of that certain 6.89 acre tract of land conveyed by Sacramento Northern Railway to Victor Industries Corporation, by Deed dated March 4, 1955, recorded March 7, 1955 in Book 758, page 105 of Official Records of Butte County, State of California; from said point of beginning the intersection of the Southeasterly production of the center line of Hemlock Street as shown on said Map and said Southeasterly line of 20th Street, bears North  $35^{\circ} 50'$

BOOK 2423 PAGE 138



East along said Southeasterly line, a distance of 2.39 feet; as shown on the survey made by Polk & Batham, January, 1955; thence from said point of beginning, North 35° 50' East along said Southeasterly line of 20th Street, a distance of 241.12 feet, more or less, to an iron pipe marking the most Westerly corner of that certain 0.015 acre tract of land conveyed by Sacramento Northern Railway to California Prune & Apricot Growers Association by Deed dated October 29, 1947, recorded November 29, 1947 in Book 421 of Official Records of Butte County, at page 251; thence South 41° 51' East along the Westerly line of said tract so conveyed by last said Deed (the bearing of said Westerly line being given in said Deed as North 41° 47' West), a distance of 285.03 feet to an iron pipe set at the most Southerly corner of said tract conveyed by last said Deed; thence South 35° 50' West parallel with said Southeasterly line of 20th Street, a distance of 180.15 feet, more or less to a point on the Northeasterly line of said 6.89 acre tract; thence North 54° 12' West along said Northeasterly line, a distance of 278.47 feet to the point of beginning.

BOOK 2423 PAGE 139



PARCEL FOUR

A parcel of land in the northwest quarter of Section 36 in Township 22 North, Range 1 East, Mount Diablo Base and Meridian, described as follows:

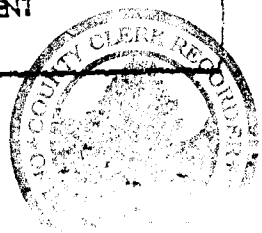
Beginning at an iron pipe marking the intersection of the southerly line of 20th (formerly 8th) Street and the westerly line of Chico Avenue, according to the official map of Mulberry Tract, Subdivision Number 1, Valley Syndicate Addition to Chico, filed in the office of the County Recorder of the County of Butte, State of California, March 14, 1907 in Map Book "6" at page 90; running thence south  $41^{\circ} 47'$  east along said line of Chico Avenue 300.0 feet to an iron pipe; thence south  $48^{\circ} 13'$  west 66.6 feet; to an iron pipe 9.0 feet easterly the center of a spur track of Sacramento Northern Railway; thence north  $41^{\circ} 40'$  west 285.56 feet parallel with said track to an iron pipe on the southerly line of 20th Street aforementioned; thence north  $35^{\circ} 54'$  east along last mentioned line 67.6 feet to the point of beginning

EXCEPTING THEREFROM that parcel of land conveyed to the City of Chico by Deed recorded September 15, 1966, in Book 1443, of Official Records, at page 292.

PARCEL FIVE

A parcel of land in the northwest quarter of Section 36 in Township 22 North, Range 1, East, Mount Diablo Base and Meridian, described as follows:

Commencing at an iron pipe marking the intersection of the southerly line of 20th (formerly 8th) Street and the westerly line of Chico Avenue, according to the official map of Mulberry Tract, Subdivision Number 1, Valley Syndicate Addition to Chico, filed in the office of the County Recorder of the County of Butte, State of California, March 14, 1907, in Map Book "6" at page 90; running thence south  $41^{\circ} 47'$  east along said line of Chico Avenue 300 feet to an iron pipe; thence south  $48^{\circ} 13'$  west 66.6 feet to an iron pipe and the point of beginning of the parcel of land herein described; thence continuing south  $48^{\circ} 13'$  west 1.95 feet to a point; thence north  $41^{\circ} 47'$  west 285.03 feet to a point on the southerly line of 20th Street aforementioned; thence north  $35^{\circ} 54'$  east along last mentioned line, 2.56 feet to an iron pipe; thence south  $41^{\circ} 40'$  east 285.56 feet to the point of beginning of the parcel of land herein described



EAST TWENTIETH STREET  
ACQUISITION NO. 28  
EASEMENT FOR RIGHT-OF-WAY PURPOSES

A right of way easement for a public street on, over, across and under that certain real property situate in the City of Chico, County of Butte, State of California described as follows:

A portion of Lot A as shown on that certain map entitled "HENRY'S 2ND ADDITION", which map was filed in the Office of the Recorder of the County of Butte in Book 1 at page 81 on November 12, 1885, and more particularly described as follows:

COMMENCING at the former intersection of the southerly line of East Twentieth Street (formerly 8th Street) with the westerly line of Fair Street (formerly Chico Avenue) according to the Official Map of the Mulberry Tract, Subdivision No. 1, recorded March 14, 1907 in the Office of the Recorder of the County of Butte in Map Book 6 at page 90;

THENCE along said former westerly line of Fair Street (formerly Chico Avenue) South  $41^{\circ}47'$  East, 8.85 feet to the existing westerly line of Fair Street and the True Point of Beginning, said point also being the most southerly point of Fair Street Acquisition No. 2 filed September 15, 1966 in Book 1443 at Page 292 Official Records of Butte County;

THENCE along said westerly line and continuing South  $41^{\circ}47'$  East, 33.16 feet;

THENCE along the arc of a 40' radius non-tangent curve to the left the chord of which bears South  $61^{\circ}31'20''$  West through a central angle of  $51^{\circ}22'40''$ , an arc length of 35.95 feet;

THENCE South  $35^{\circ}50'$  West, 35.64 feet;

THENCE North  $41^{\circ}43'$  West, 26.63 feet to the southerly line of East Twentieth Street;

THENCE along said southerly line North  $35^{\circ}50'$  East, 53.92 feet;

THENCE along the arc of a 30.00 foot radius non-tangent curve to the right, the chord of which bears North  $66^{\circ}53'43''$  East; through a central angle of  $32^{\circ}25'37''$ , an arc length of 16.98 feet to the westerly line of Fair Street and the True Point of Beginning;

Containing 0.044 acres, more or less.

The above described right-of-way easement is located on Assessor's Parcel Number 005-24-4-002-0.

BY: G.M.  
Checked: G.M. / TV  
Approved: PCR  
Date: 10/5/89

EXHIBIT "A-1"

EXHIBIT A

Page 1 of



91-06860

EAST TWENTIETH STREET  
ACQUISITION NO. 29  
RIGHT-OF-WAY

All that certain real property situate in the City of Chico,  
County of Butte, State of California described as follows:

Portions of Lot 8 & Lot A as shown on that certain map entitled,  
"HENRY'S 2ND ADDITION", which map was filed in the Office of  
the Recorder of the County of Butte in Book 1 at Page 81 on  
November 12, 1885 and more particularly described as follows:

COMMENCING at the intersection of the centerline of Hemlock  
Street (formerly Walnut Street) with the centerline of East  
Twentieth Street (formerly 8th Street) according to the Official  
Map of the Mulberry Tract, Subdivision No. 1, recorded March 14,  
1907 in the Office of the Recorder of the County of Butte in Map  
Book 6, at Page 90;

THENCE along said centerline of East Twentieth Street South  
35°50' West, 2.39 feet;

THENCE leaving said centerline of East Twentieth Street South  
54°10' East, 30.00 feet to the southerly line of said East Twentieth  
Street and the True Point of Beginning;

THENCE along said southerly line of East Twentieth Street North  
35°50' East, 241.12 feet;

THENCE leaving said southerly line of East Twentieth Street South  
41°43' East, 26.63 feet;

THENCE South 35°50' West, 235.36 feet;

THENCE North 54°12' West, 26.00 feet to said southerly line of  
East Twentieth Street and the True Point of Beginning;

Containing 0.142 acres, more or less.

The above described parcel is a portion of Assessor's Parcel  
Number 005-48-0-015-0.

By: TJM

Checked: TA

Approved: E.C.R.

EXHIBIT A

Page 2 of 2



**EXHIBIT B**



The logo for ENVIROforensics, with "ENVIRO" in a bold, sans-serif font inside a dark oval, and "forensics" in a stylized, lowercase script font.**Final Interim Remedial Action Work Plan**365 and 395 East 20<sup>th</sup> Street

Chico, California

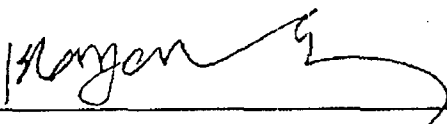
March 7, 2003

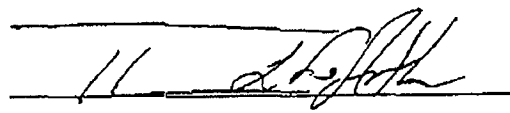
*Prepared For:*

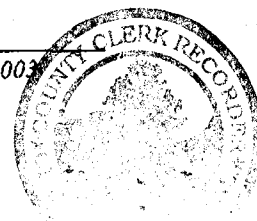
Resolution Law Group, P.C.  
3717 Mt. Diablo Boulevard, Suite 200  
Lafayette, California 94549

*Prepared By:*

Environmental Forensic Investigations, Inc.  
11875 Dublin Boulevard, Suite A-200  
Dublin, California 94568

  
for Sam Brathwaite, C.E.G., C.H.G.  
Senior Hydrogeologist

  
Thomas L. deArth, R.E.A.  
Project Manager



## 2.0 BACKGROUND

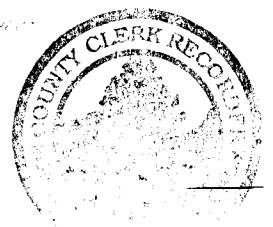
### 2.1 Study Area Description

The former Site is located at 365 and 395 East 20<sup>th</sup> Street in Chico, California. As defined in the Order [§3(a)], the term "the Site" refers to "365 and 395 East 20<sup>th</sup> Street, Chico, California, while the "Study Area" refers to the area where hazardous substances or their breakdown products emanating from the Site, have migrated (i.e., the area stretching approximately one mile from Mulberry Street to Berrington Drive, covering a width of approximately ½ mile in the vicinity of Stanley Park). According to the Order, the Study Area is also referred to as the "Southeast Chico Plume".

The Study Area is located in the City of Chico, Butte County, California. Chico is located approximately 100 miles north of Sacramento, California, in the northern portion of the Sacramento Valley (see Figure 1). The Sacramento Valley is a northwest-trending structural trough that extends approximately 150 miles north from the Sacramento-San Joaquin Delta, occupying an area of approximately 6,500 square miles (Brown and Caldwell, 1994). The Study Area is situated on an alluvial fan that slopes gently toward the west and southwest, and is bounded on the east by the foothills of the Cascade Range and on the west by the Sacramento River. Surface elevations within the Study Area are generally from 170 to 204 feet above mean sea level.

### 2.2 Site History

Between 1906 and 1951, the parcel of land located at 365 East 20<sup>th</sup> Street was part of a railroad yard. According to Brown and Caldwell (1994), Interurban's Special Publications 9, 26, 32, and 34 located at the California State Railroad Museum Library "the Chico Electric Railway and its successor company, Northern Electric, moved its maintenance and administrative offices from Diamond Match Company to 365 east 20<sup>th</sup> Street and surrounding land in 1906." Known as the "Mulberry Shops" or the "Mulberry Yard" the area was "used to build and maintain rail cars, electric motors, and electric locomotives, and to scrap trains." In 1918, the Sacramento Northern Railroad Company was incorporated to take over the property of Northern Electric Railroad.



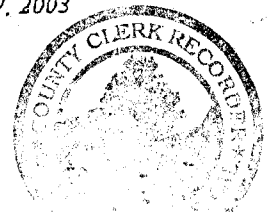
In 1958, an aluminum tube and can manufacturing business operated by Victor Industries relocated their operations from a site near the Chico Municipal Airport to 365 and 395 East 20<sup>th</sup> Street. The company operated at the Site until September 1984, when the business was sold to VIC, Inc., a Victor Industries successor. VIC, Inc., operated at the same location from 1984 to September 1985, when it ceased business operations.

Victor Industries' manufacturing operations took place in two structures on the property: (1) a maintenance and warehouse building, which was a converted Mulberry Shop building and (2) a manufacturing building that was constructed by Victor Industries and included offices and a lunchroom. Aluminum tubes and cans were manufactured in the main manufacturing building. The can lines were oriented along the long axis of the building (Brown and Caldwell, 1994) and included a decorator press for applying labels, a tube manufacturing section, and a vapor degreasing section for cleaning the aluminum tubes. DTSC asserts that trichloroethene (TCE) was used as a degreaser and as a blanket wash until approximately 1980 when TCE was replaced by tetrachloroethene (PCE) (Brown and Caldwell, 1994). DTSC identified the Site as a source of contamination within the Study Area.

In 1984, Louisiana-Pacific Corporation (L-P) purchased the property located at the end of 16<sup>th</sup> Street in Chico, California from Diamond Match Company (Diamond). Diamond occupied the L-P property from the early 1900s until it was sold to L-P in 1984 (SHN, 1994). Three operations at the L-P property commonly used solvents, including TCE. Those operations were (1) maintenance shop steam cleaning operations and garage, (2) the Match Factory offset printing operations, and (3) the apiary wax refining area. L-P sold the property to the current owner, Barber Land, LLC.

## 2.3 Study Area Geology

The Study Area is located on the eastern side of the Northern Sacramento Valley. The Sacramento Valley is a large northwest trending structural trough extending from the Sacramento-San Joaquin Delta north to Red Bluff, California. It is bounded by the Sierra Nevada Range on the east, the Cascade Range on the northeast, and the Coast Range on the west.



The Study Area sits on gentle westward sloping Pleistocene alluvial fan deposits underlain by the Pliocene age Tuscan Formation. The Tuscan Formation crop out continuously on the northeastern flanks of the Sacramento Valley and extends westward beneath the valley floor to a distance roughly 5 miles west of the Sacramento River (Brown and Caldwell, 1999). The Tuscan Formation consist primarily of volcanic sediment with few tuff-breccia beds and forms a wedge-shaped mass with a southwesterly dip. The upper part of the formation tends to have more clay and finer-grained sediments than the lower part, which is the reason for groundwater being confined to the more permeable underlying sand units (SHN, 1994, Metcalf & Eddy, 1988). The Tuscan Formation provides groundwater recharge from the foothills of the Cascade Range toward the valley.

The Chico monocline is the largest structural feature, which is located along the edge of the valley approximately 10 miles northeast to east of the Study Area. This feature is a northwest-trending, southwest-dipping flexure that extends approximately 45 miles along the northeast side of the Sacramento Valle from Chico to Red Bluff. As part of the this feature, the Tuscan Formation forms a wedge-shaped mass thinning from about 1,600 feet thick in the Cascade range to approximately 300 feet beneath the Sacramento Valley (SHN, 1994, Metcalf & Eddy, 1988).

The City of Chico and surrounding areas have been built on alluvial fan deposits consisting of volcanic materials of the Pliocene-age Tuscan Formation, which comprises the foothills east of Chico (Brown and Caldwell, 1999, Brown and Caldwell, 1994; SHN, 1994; URS, 1993). The alluvial fan sediments consist of gravel, sand, silt, and clay deposited by Big Chico Creek, Little Chico Creek, and in Camache Creek. The fans in the Study Area have coalesced due to meandering stream channels in which sediments are deposited in new ones as old ones are abandoned. Younger alluvial fans are up to 50 feet thick and are underlain by older, weakly - to well-cemented alluvial fan deposits (Brown and Caldwell, 1999, SHN, 1994, Metcalf & Eddy, 1988). These sediments have been classified by the California Division of Mines and Geology as the Modesto Formation.

Several streams have cut into the foothills, including Big and Little Chico creeks, which flow west and southwest, respectively, toward the Sacramento River. Several irrigation ditches in the Study Area are used to control drainage from orchards in the area. There are no major lakes or ponds in the Study Area. The Study Area is drained by storm sewers that convey urban runoff



into diversion channels and into Big and Little Chico creeks. Storm water runoff is also directed into dry wells throughout the urban portions of the Study Area.

## 2.4 Study Area Hydrogeology

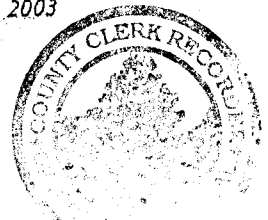
The Study Area is underlain by strata with a range of grain sizes as follows: (1) silty clay to elastic silt; (2) sandy silt to silty sand; (3) silty sand to sand; (4) gravelly sand to sandy gravels; and (5) cobbles. These sand, gravel, and cobble units (units of relatively high permeability) form the water bearing or aquifer units. The units of low permeability (silts and clays) form the aquitard that separate the aquifers.

Most Chico residents receive water from the California Water Services Corp. (CWS), a private water company that has operated in Chico since the 1950s, and currently maintains and operates 61 wells in the area. CWS wells that are near the Study Area include CWS-60 (approximately 1,000 feet to the east), CWS-51 (approximately 1,500 feet to the south), CWS-11 (approximately 2,700 feet to the southwest), CWS-15 (approximately 2,250 feet to the northwest), CWS-46 (approximately 3,700 feet to the northwest), and CWS-5 (approximately 1,500 feet to the northwest) (see Figure 2). In addition to CWS wells, there are private wells in the Stanley Park area. Despite the fact that they have water from CWS through the pipe line paid for as an IRM by certain of the Victor Muscat Trusts, there is a possibility that some residences in Stanley Park use water from private wells for domestic purposes.

As shown in the geologic cross sections presented in Figures 3 and 4, the Study Area is underlain by at least six water-bearing units that are designated by the letters A, B, C, D, E, and F. A is the shallowest. Within the Study Area, the underlying strata are further characterized by varying degrees of continuity, thickness, and permeability. General descriptions of units A through E are provided below. Sufficient data regarding the F aquifer unit is not currently available. Therefore, the F aquifer unit cannot be accurately described.

- First Water Bearing Zone, Unit A – This unit occurs from groundwater surface to a depth of approximately 70 feet bgs. This unit appears to be unconfined<sup>a</sup> and is comprised of silts and clays interbedded with sand and gravel. Depth to

<sup>a</sup> Unconfined Aquifer – Water levels in such an aquifer is at the same level as the saturated pores.



groundwater is generally between 15 to 30 feet bgs and groundwater flow is towards the southwest. Testing completed at the L-P Site property, located southwest of the Site, provided horizontal hydraulic conductivity ( $K_h$ ) estimates of 27 to 220 feet per day (ft/day) (SHN, 1994). This range in hydraulic conductivity reflects changes in aquifer materials and thickness across the Study Area.

- Second Water Bearing Zone, Unit B – This unit is characterized by three subunits of moderate to high permeability zones separated by low-permeability zones. The upper zone in this water-bearing unit, the B1 zone, occurs at a depth of 90 – 115 feet bgs across the Study Area and is comprised of mostly gravel and sand. The middle unit, the B2 zone, occurs at a depth between 110 - 160 feet bgs across the Study Area, varies between 10 to 20 feet thick, and consists of primarily sand and gravel. The lower unit, the B3 zone, occurs between 130 - 190 feet bgs across the Study Area.

The B unit is comprised of mostly sands and gravels that generally thicken near the center of the site and becomes thinner towards the north and south. Testing completed by SHN (1994) at the L-P Site and by URS (1993) and Henshaw (January 29, 2002) provided  $K_h$  estimates of 27 to 680 ft/day. This range in  $K_h$  reflects local changes in aquifer materials and thickness across the site. Together the B1, B2, and B3 units form the B-aquifer unit that ranges from 50 to 90 feet thick across the Study Area. Groundwater levels in this unit generally occur between 35 and 45 feet bgs and appear to be confined<sup>b</sup>. Groundwater flow is towards the southwest.

- Third Water Bearing Zone, Unit C – This unit occurs at a depth between 150 and 200 feet bgs across the site. This unit appears to be discontinuous across the Study Area and consists of silty and clayey sands and gravels, and cobbles and ranges from about 10 to 35 feet in thickness. It grades into the bottom of Unit B in the southwestern part of the Study Area (Brown and Caldwell, 1994). In general, groundwater potentiometric surface in the C unit occurs between 35 to 45

<sup>b</sup> Confined Aquifer – Water levels in such an aquifer occur above the top of the unit. Water in the aquifer unit is under pressure because the aquifer is sandwiched between lower permeability materials.





feet bgs suggesting confining conditions. A thin aquitard separates Unit C from Unit B near the center of the Study Area. The groundwater flow in this unit is toward the southwest.

- Fourth Water Bearing Zone, Unit D – This unit occurs at a depth between approximately 180 to 240 feet bgs across Study Area, appears to be confined, and is comprised of mostly silty and clayey sands and gravels.
- Fifth Water Bearing Zone, Unit E – This unit occurs at a depth between 230 and 275 feet bgs across the site and appears to reach a thickness of approximately 120 feet in the central portion of Study Area. This unit is comprised of mostly clayey and silty sands and gravels and is known to be within the Tuscan Formation, which may extend down to around 500 feet bgs.

The deepest boring drilled for the RI during the installation of VMW-25E was advanced down to a total depth of 446 feet bgs. At 446 feet bgs, the lower boundary of the Tuscan Formation had not been defined. Between 398 and 405 bgs and again between 414 and 422 bgs a thin aquitard-like material (Clayey Sand: USGS Code = SC) was observed.

In general, based on the stratigraphy and hydraulic 'head' relationships observed, there appears to be a downward vertical hydraulic gradient between the B (B1, B2, B3) and C aquifer units. Brown and Caldwell (1994) made similar statement regarding the A and B aquifer unit relationship. Additionally, during the constant-discharge aquifer testing conducted by EnviroForensics in 2001 and summarized in *Aquifer Testing and Interim Groundwater Extraction System Design Basics Memorandum* (Henshaw Associates, January 29, 2002) communication between the B and C aquifer units was confirmed when C aquifer observation wells (VMW-24 and VMW-25C) were observed to have 0.3 ft change in water levels at the end of the test in test well VMW-25B. Similarly, at the end of the constant-discharge test in test well VMW-24C, a slight change of 0.1 ft change in response to pumping was observed in monitoring well VMW-23B and VMW-25B. This data suggest that the B and C the aquifer units appear to behave as semi-confined (leaky) aquifers as both seem to receive and lose water to the overlying or underlying aquifer units (i.e., there is communication between the two aquifers).



The logo for ENVIROforensics, with "ENVIRO" in a bold, sans-serif font inside a dark oval, and "forensics" in a stylized, lowercase font with a flourish.

Groundwater in the A, B, and C aquifer units flows to the southwest. However, it has been reported that although groundwater flow gradients are similar in the A, B and C aquifer units, due to groundwater production in the lower aquifers (i.e., below the C unit aquifer), the direction of groundwater flow in the lower aquifer units is 180 degrees opposite and lower magnitude (Brown and Caldwell, 1999; URS, 1996, Brown and Caldwell, 1994, SHN, 1994, and Metcalf & Eddy, 1988). The Study Area, however, currently lacks sufficient data points to confirm the groundwater flow gradient in the D and E aquifer units.

## 2.5 Regulatory History

According to Brown and Caldwell, October 1994, groundwater sampling conducted in October 1984, as mandated by California Assembly Bill 1803 (Brown and Caldwell, 1994), identified VOCs in several municipal supply wells in south and central Chico and at the Chico Municipal Airport. In early 1986, the RWQCB conducted a follow-up study that identified several potential sources of VOC contamination in groundwater. At the same time, the DTSC (then known as Department of Health Services) listed the Chico Groundwater and the Chico Municipal Airport sites in the Bond Expenditure Plan. After becoming aware of the groundwater contamination in the southeast Chico area in early 1986 and in June of that year, DTSC assumed the lead role in regulating and investigating the groundwater contamination.

On January 5, 1989, following a preliminary assessment, DTSC issued Remedial Action Order Docket No. HSA 88/89-014 (RAO) to Victor Industries as a responsible party. On February 22, 1989, the RAO was amended to include VIC, Inc., as a responsible party. On May 22, 1992, the DTSC issued Imminent and Substantial Endangerment and Remedial Action Order Docket No. I/SE 91/92-007 (ISERAO), to Victor Industries, VIC, Inc., the Trustees of the Victor Muscat Trust, CCL Industries, Inc., and Advanced Monobloc, Inc. On October 29, 1992, the RAO was amended to add former owners of the East 20<sup>th</sup> Street property, Clay McGowan and Faye T. McGowan.

Pursuant to Paragraph 4(f) of the Order, DTSC is authorized to review, comment upon and modify all submissions made pursuant to subsections a through e of Paragraph 4 of the Order, as set forth in the December 22, 1999 Injunction (as defined in the Order).



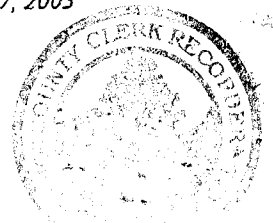
DTSC remains the lead agency for regulatory oversight of remedial activities associated with the Site.

## 2.6 Previous Investigations

To follow up on the results of municipal well sampling in 1984, the DTSC completed a preliminary assessment of Unit A under the Site. The preliminary assessment involved a review of existing information on the Site and the collection of soil gas samples from 13 locations to evaluate whether public health or environmental risks could potentially be associated with the Victor Industries facility. By March 1991, additional investigations included additional soil gas sampling and the installation of five groundwater monitoring wells at the Site. These activities comprised the Phase 1 remedial investigation at the Site.

The Phase 2 investigation was limited to an analysis of the southeast Chico shallow and deep groundwater systems. As part of a larger study of several separate VOC plumes underlying the Chico area, the DTSC found that approximately 34 percent of the groundwater samples collected contained TCE emanating from the Site and required the installation of 23 additional monitoring wells at locations and depths specified by the DTSC. The Phase 2 investigation was completed by October 1993; it identified the extent of contamination in the shallow water bearing unit and the axis of the VOC plume in Units B and C.

Brown and Caldwell completed the Phase 3 investigation in 1994. This included the drilling and installation of 20 additional monitoring wells to evaluate the distribution and extent of VOCs in groundwater within the Study Area. Brown and Caldwell submitted their final RI and feasibility study reports to the DTSC in October 1994. The objective of the Phase 3 RI activities was to define the lateral and vertical extent of TCE in groundwater in the Study Area. In their Phase 3 investigation Brown and Caldwell (1994) established that TCE was the primary COC for the Study Area. Brown and Caldwell concluded that there was no evidence of a dense nonaqueous phase liquid (DNAPL) acting as a source of TCE but that plumes of TCE in concentrations exceeding the maximum contaminant levels (MCLs) exist in the B and C aquifer units. Data from Brown and Caldwell's investigation shows that the highest concentrations of TCE were found in the B aquifer unit.



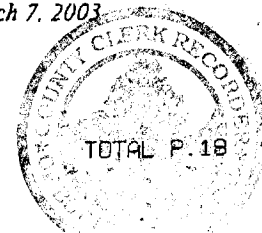


Brown and Caldwell (1994) also reported TCE was not detected above the MCL (i.e., 5  $\mu\text{g/L}$ ) in the A aquifer unit and that (at that time) the highest concentrations in samples collected from monitoring wells (up to 110  $\mu\text{g/L}$  in VMW-10B) were identified in the center of the plume (i.e., L-P Site) in the B aquifer unit. These high concentrations were found to diminish rapidly downgradient and were reported to be relatively low upgradient from the center of the plume. Brown and Caldwell interpreted the data to suggest that the leading edge of the B aquifer unit plume was not receding or advancing at that time and that the no significant change in the aerial extent of the plume had changed during the course of the project. As a result, Brown and Caldwell (1994) suggested that the B and C aquifer units plume had reached equilibrium. Although current data (collected from 2001 to the present) are in agreement with Brown and Caldwell's conclusions for the B aquifer unit, current data do not support these conclusions for the C aquifer unit.

Brown and Caldwell (1994) reported that the highest concentrations TCE in the C aquifer unit were also identified in the center of the plume. Of the 13 wells completed in the C aquifer unit, Brown and Caldwell reported that five (5) had samples containing TCE concentrations above the MCL. The maximum concentration of TCE detected in the C aquifer unit was 39  $\mu\text{g/L}$  from samples collected in VMW-16.

Subsequent to its review of the Brown and Caldwell's 1994 Phase 3 report (*Final Remedial Investigation Report 365 East 20<sup>th</sup> Street, Chico, California*), DTSC believed that further investigation and characterization was necessary to delineate the extent of contamination in deep groundwater in the Study Area before an acceptable remedy could be determined for the Site. The scope of work for the additional investigation was set forth in the Order and described in the Phase 4 RI Workplan.

Recently, EnviroForensics completed the Phase 4 RI. The scope of work included installation of nine wells; a B and C-Unit monitoring/extraction well (VMW-23B, VMW-24C); additional B, C, D, and E aquifer monitoring wells (VMW-12C, VMW-26B/C, VMW-25B/C/D/E); and the collection of an grab groundwater sample at 446 feet bgs. Well construction and boring log summaries for these activities are presented in *Aquifer Testing Results and Interim Groundwater Extraction System Design Basis Memorandum* (Henshaw, January 29, 2002). EnviroForensics also completed seven quarters of groundwater monitoring activities during the 2001 and 2002 calendar years as required by the Order. Pursuant to Paragraph 4(c) of the Order, so long as the





Order is in effect, EnviroForensics will continue to sample and monitor groundwater on a quarterly basis until trial commences.

## 2.7 Applicable and Relevant and Appropriate Requirements (ARARs)

According to California Health and Safety Code Section 25256.1, remedial actions must be based on the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) established pursuant CERCLA. A key component of the NCP is the requirement that final remedial actions achieve a level of cleanup that protects human health and the environment and also comply with applicable or relevant and appropriate requirements (ARARs). Under CERCLA if hazardous substances are to remain onsite, remedial measures must attain legally ARARs [CERCLA (121)(d)(2)(a)]. ARARs are defined in CERCLA as federal and state promulgated standards, requirements, or limitations of federal environmental laws and any more stringent standards, requirements, or limitations of state environmental or facility siting laws.

Applicable Requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state or facility siting laws that specifically address a hazardous substance, pollutant, COC, remedial action, location, or other circumstance at CERCLA site." [CFR 300.5].

Relevant and Appropriate requirements are 'those same cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state or facility siting laws that, while not 'applicable' to a hazardous substance, pollutant, COC, remedial action, location, or other circumstance at CERCLA site that their use is well suited to the particular site.' [Code of Federal Regulations (CFR) 300.5].

In addition, federal and state agencies may also use 'to-be-considered' requirements (TBCs), which are non-promulgated criteria, advisories, guidance, or proposed regulations issued by the federal or state governments that are not legally binding and do not have the status of ARARs, in developing CERCLA requirements.

### 2.7.1 *Determination and Identification of Site-Specific ARARs*

An ARAR evaluation was initially performed for the Site by Brown and Caldwell in its *Final Feasibility Study Report* dated October, 1994. In its evaluation, Brown and Caldwell used a two-step process to determine whether a federal or state or facility siting requirement was applicable or relevant and appropriate for the COCs associated with the Site. In the event that a requirement was deemed not applicable, Brown and Caldwell made a determination whether that requirement was relevant and appropriate. Brown and Caldwell evaluated all federal and state ARARs and TBCs including the State Water Quality Control Plan for the Central Valley Basin ("Basin Plan"), and State Board Resolutions 68-16A and 92-49. A copy of the Brown and Caldwell's ARAR evaluation is presented in Appendix B.

Brown and Caldwell concluded that the potential ARARs for the Site would be the State of California promulgated primary MCLs, which for TCE, and PCE is 5  $\mu\text{g/L}$  while the MCL for 1,1-dichloroethylene is 6  $\mu\text{g/L}$ . MCLs are enforceable standards adopted by the DTSC for drinking water supplies.

For the purpose of this Work Plan, EnviroForensics will continue to follow the potential ARARs determined by Brown and Caldwell (1994) until an updated evaluation is conducted, as discussed in Section 5.2 of this Work Plan.

### 2.7.2 *ARAR Waivers*

Under Section 121 (d)(4) of CERCLA and 40 CFR 300.430(f)(1)(ii)(C)(1)-(5) applicable or relevant and appropriate requirements (ARARs) may be waived in the following circumstances:

- The selected remedial action is an interim measure and will become part of a total remedial action that will attain ARARs when completed.
- Compliance with the ARAR will result in greater risk to human health and environment than other alternatives.
- Compliance with the ARAR is technically impracticable from an engineering perspective.
- The selected remedial action will attain a standard of performance equivalent to the ARAR through use of another method or approach.



- The ARAR is a state requirement which the state has not consistently applied, or demonstrated the intention to consistently apply, in similar circumstances.

Although CERCLA allows for an interim remedial measure to be implemented without ARARS, to accommodate state regulatory concerns, until an updated ARAR evaluation is performed (as discussed in Section 5.2). The Work Plan contemplates that the current proposed ARARs (i.e., MCLs) for the Site will continue to be followed.

